REMARKS

In response to the Official Action mailed December 14, 2004, Applicants request reconsideration. In this Response, no claims are added or canceled so that claims 1-5, 7-19, and 21-66 remain pending.

Claims 1, 7, 8, 9, 11, 13, 15, 21-23, 25, 27, 44, 46, 63, and 65 are amended to recite a method for creating a binary tree data structure, the data structure embodied in a computer-readable medium, from an ordered list of elements, each element having an associated value in the list (see page 6, lines 2-10 of the patent application)

The Official Action rejected claims 1-5, 7-19, and 21-66 as non-statutory subject matter. The Official Action also rejected claims 1-5, 7-19, and 21-66 under 35 U.S.C. § 112, first paragraph, as failing to comply with the enablement requirement, and under the second paragraph as being indefinite. The Official Action further rejected claims 1-5, 7-19, and 21-66 as unpatentable over Cormen et al. ("Introduction to Algorithms," hereinafter Cormen) in view of Bozkaya et al. ("Indexing Large Metric Spaces for Similarity Search Queries," hereinafter Bozkaya).

Processes for constructing computer data structures fall within the domain of statutory subject matter because a data structure is not a mere abstract idea, and accordingly, a method for creating such a data structure exhibits utility. Furthermore, the claims are enabled by the specification and drawings which comprise substantial description directed to building the described binary tree, and the plain meaning of the term "median" obviates the need to provide a special definition. Moreover, the combination of Cormen and Bozkaya produces entirely different data structures that those created by the method of the present invention and fails to teach or suggest all of the claimed limitations. .

Data Structures And Methods For Creating Them Are Patentable

The Official Action, in response to Applicants' arguments, contends that it is possible to create a data structure in one's mind or by use of pencil and paper. A data structure, as commonly understood in the art of computer programming, is a tool for organizing data in a computer. The definition of "data structure" is "a physical or logical relationship among data elements, designed to support specific data manipulation functions" (*See The New IEEE Standard Dictionary of Electrical and Electronics Terms* 308 (5th ed. 1993); MPEP § 2106)

.The meaning of the term "data structure," within the context of the computer arts, inherently implies the organization of data stored in a computer-readable medium; otherwise, there is nothing to organize. Nevertheless, to advance prosecution, Applicants have amended the independent claims to specifically recite a method for creating a binary tree data structure, the data structure embodied in a computer-readable medium. Accordingly, claims 1, 7, 8, 9, 11, 13, 15, 21-23, 25, 27, 44, 46, 63, and 65, as amended, are directed to statutory subject matter.

Moreover, Applicants note that even if independent claims 1, 7, 8, 9, 11, 13, 15, 21-23, 25, 27, 44, 46, 63, and 65 were directed to non-statutory subject matter (which they are not), dependent claims 2, 12, 14, 16, 26, 28, 33, 38, 43, 45, 47, 52, 57, 62, 64, and 66 are directed to a computer-readable medium for executing computer-readable instructions, which has long been recognized as statutory subject matter *In re Beauregard*, 53 F.3d 1583; 35 USPQ.2d 1383 (Fed. Cir. 1995). Claims 2, 12, 14, 16, 26, 28, 33, 38, 43, 45, 47, 52, 57, 62, 64, and 66 have been erroneously rejected under 35 U.S.C. § 101

The Claimed Subject Matter Is Enabled By The Specification

The Official Action contends that the definition of the term "median" and the algorithm used for obtaining the median is not described in the specification as to enable one ordinarily skilled in the art. This contention is plainly erroneous. The term "median" is a very basic mathematical term, commonly known to mean the middle value in a distribution, above and below which lie an equal number of values. Moreover, the application specifies that where there are an even number of values in the distribution (thus, where there is no single middle value), the left value, as it appears in the distribution, of the two middle values is selected as the median (see page 7, lines 1-8; page lines 1-8; and Figures 6-11 of the patent application). The algorithm for building a binary tree by iteratively selecting a median is also described at page 7, lines 1-8; page lines 1-8; and Figures 6-11 of the patent application. Accordingly, with the specification and drawings of the present application, along with an ordinary knowledge of discrete mathematics and computer science, one would clearly be enabled as to iteratively select a median to build a binary tree, as recited by the claims. The rejection should be withdrawn.

The Term "Median" Is Not Indefinite

The Official Action contends that it is not clear if the term "median" is used as a middle value of a list or a middle value of an ordered/sorted list. While the Applicants believe that the specification and claims are clear that the term "median" is used to mean the middle, or left

middle index value of an ordered/sorted listthe claims have been amended to specify that the list of elements is a sorted list.

The Official Action further contends that it is not clear how a binary tree is inserted from the median. A binary tree is not "inserted" from the median. The claims are directed to selecting a median as a parent node and building a binary tree by iteratively selecting medians from smaller sets..

Accordingly, the rejections should be withdrawn.

The Cited Art Fails to Teach of Suggest Every Claim Limitation

The combination of Cormen and Bozkaya fails to teach or suggest every limitation of the claims. In the Amendment of June 1, 2004, Applicants argued that given a list of three elements A, B, and C, the tree creation method of Bozkaya may select C as the root node, whereas the present invention requires B to be selected as the root node. The Official Action responded by noting that the choice of the root node Bozkaya may be arbitrary, and thus could also select B as the root node. Such reasoning is directly contrary to the principle that every limitation must be taught or suggested. A method that leaves unspecified which node should be used as a starting node by definition does note teach the step of specifically selecting a particular node. Thus, the requirement that that a particular node must be chosen is a limitation, and that limitation must be taught or suggested to render the claim unpatentable.It is not enough that an element of the claims theoretically could exist without contradicting the teachings of a reference.

To demonstrate the differences between the method of the present invention and that disclosed in Bozkaya, consider page 7, lines 1-8; page lines 1-8; and Figures 6-11 of the patent application, which produces the binary tree in Figure 11 from the ordered set of index values S = (1, 2, 3, 4, 5, 6, 7, 8, 9, 10) in accordance with the methods of the invention. By contrast, consider the operation of the Bozkaya method on set S. Notably, in Bozkaya the creation of the binary tree is based on a distance metric from an arbitrary vantage point rather than the median of the set (see Section 3.3 of Bozkaya). However, to illustrate the differences between the methods *even if* Bozkaya arbitrarily selects the median as the vantage point, assume the arbitrary vantage point is the median of the set, and thus $S_v = 5$. The method progresses as follows:

1. M is calculated to be the median of the distances of all set members from S_v. Thus, for set S the set of distances D = $d(S_i, S_v)$ for all elements of the set S is D = (4, 3, 2, 1, 1, 2, 3, 4), that is d(1, 5) = 4, d(2,5) = 3, d(3, 5) = 2, etc. Accordingly, the median M of D is 2. To clarify, every member of the set is either 1, 2, 3, or 4 "places" away from the vantage point S_v = 5. Deferring to the left, 2 is the median of all of those distances.
2. Next, the remainder of set S is divided into a left set S_L and a right set S_R based on distance from the vantage point. If a set member is less than or equal to M, it is placed in S_L. If a set member is greater than or equal to M, it is placed in S_R. After this division, the result is that S_L = (3, 4, 6, 7) and S_R = (1, 2, 8, 9, 10). Thus, S_L is the set of values whose distance from 5 is less than or equal to the median distance metric 2, and S_R is the set of values whose distance from is greater than this value (ignoring the fact that, by Bozkaya's method, values 3 and 7 would be in both sets).

This analysis need not proceed any further. Because the two methods result in two different divisions of the initial set, it is obvious that they cannot produce the same tree. That is, because S_L in the method of the present invention (1, 2, 3, 4) is different from S_L in the method of Bozkaya, and because S_R in the method of the present invention (6, 7, 8, 9, 10) is different from S_R in the method of Bozkaya, it is clear that the ordering of the tree will be vastly different. This is because of Bozkaya's reliance on a median of distances, rather than a median of the set. A step of finding the median of metric distances of elements in a set from a vantage point is not suggestive of or equivalent to finding the median of that set. The Official Action's assertion that Bozkaya teaches or suggests the method of the present invention is is contrary to established law, requiring a teaching or suggestion of *every* element, and is untenable in view of the fact that, given identical input, the two methods produce different results.

Reconsideration and withdrawal of the rejections, as well as prompt allowance of the pending claims, are earnestly solicited.

Respectfully submitted,

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